Developing mathematical thinking in the primary classroom (DMTPC) Project

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School of
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Developing Mathematical Thinking in the Primary Classroom (DMTPC) Project

Final Report

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1.0 Introduction

This project was funded by the Scottish Government by a grant of £46,331 which was received in the financial year 2010-11 and which was used to support the development over the period 2010-12. The project has been led by Professor Brian Hudson supported by Dr Sheila Henderson as Project Manager and Dr Alison Hudson as Project Researcher.

The project proposal was submitted against a background in which, despite past initiatives to improve the teaching and learning of mathematics, most mathematics lessons in Scotland still tend to feature some form of teacher-led demonstration followed by children practising skills and procedures from a commercially produced scheme (Scottish Executive Education Department, 2005). These findings were confirmed by TIMSS (IEA, 2008) which found that 72% of both P5 and S2 pupils were taught using a textbook as the primary resource compared to the international average of 65% and 60%, respectively. A recent Scottish Survey of Achievement (Scottish Government, 2009) also reported that pupils using textbooks and working quietly on their own was the most common form of activity in mathematics classes in Scotland. More recently the Scottish Survey of Literacy and Numeracy reported the activities in which the highest percentage of pupils reported they participated 'very often' were "listen to the teacher talk to the class about a topic" (62% in P4 and 64% in P7 and S2) and "work on your own" (between 55 and 61%) (Scottish Government, 2012, p.13).

This background context suggests that attempts to move to more constructivist models of teaching and more active approaches to learning mathematics have not been as successful as might have been hoped. It also points towards the importance of sound subject knowledge and also of teacher confidence that is associated with this (Henderson and Rodrigues, 2008). Furthermore it raises questions about the nature of mathematics and highlights the importance both of teachers' beliefs and the affective dimension for student learning (Henderson and Hudson, 2011).

2.0 Aims

The project was designed with the aim of developing, in collaboration with teachers, a Postgraduate course of CPD for teachers on the theme of "Developing Mathematical Thinking in the Primary Classroom" (DMTPC). The course was designed to form the first stage in a Masters level programme in Mathematics Education for Primary Specialists in Mathematics and to be accredited as a free-standing module worth 30 credits leading towards a Postgraduate Certificate in Developing Mathematical Thinking.

3.0 Strategic Objectives

The strategic objectives of the project were to:

1. Establish a Curriculum (for Excellence) Development Partnership on the theme of "Developing Mathematical Thinking in the Primary Classroom" (DMTPC) with a group of local primary schools.
2. Plan a programme of CPD within this Partnership on the theme of DMTPC.
3. Implement this programme with a group of teachers.
4. Evaluate the programme and disseminate the outcomes for wider impact.
5. Establish the course as a part of the wider CPD provision within the School of ESWCE in order to ensure sustainability beyond the lifetime of the project.

The project achievements in relation to each of these objectives are reported in the sections that follow.

4.0 Partnership Group

The first meeting of the Curriculum Development Partnership Group took place on 17th September 2010. The group included three teachers with one from each of the Local Education Authorities (LEA) in Fife, Angus and Dundee. These were joined by two LEA staff members with one from Fife and the other from Angus. So the membership of the Partnership Group was as follows:

Brian Hudson, Project Director, University of Dundee

Sheila Henderson, Project Manager, University of Dundee

Ann Black, Depute Head Teacher, Commercial Primary School, Dunfermline, Fife

Morag Taggart, Depute Head Teacher, Grange Primary School, Monifieth, Angus

Susan Walker, Acting Depute Head Teacher, Lochee Primary School, Dundee

Carol Lyon, Education Support Officer, Educational Development Service, Angus Council

Sheona Goodall, Teacher Induction Manager, Education, Fife Council

The second meeting of the group took place on 5th November 2010 and at that time it became clear that it was proving to be difficult to identify teachers to participate in the project within the initially planned time scale. School development plans were already decided, as was the focus for CPD for many teachers for the year 2010-11. Therefore it was decided to seek an extension to the project to allow more time to recruit the participating teachers. Subsequently the extension was agreed with the representative of the Scottish Government. The group met on three further occasions in February, June and October 2011 as part of the programme development process outlined below. These meetings were supplemented by email communication during this period.

5.0 Curriculum Development

Several milestones in the planning process had been achieved by the time of the third meeting of the Parthership Group on 4th February 2011. These included the setting up of a module on the University of Dundee Virtual Learning Environment, *My Dundee*, which at that time was still in the process of being populated with module materials; the module descriptor had been validated by the School Academic Quality Assurance Committee and had been sent to the GTCS for validation which was subsequently granted; a leaflet advertising the module had been produced (Appendix 1) and a GLOW group had been set up. The latter environment was not used extensively since it proved to be the case that all communication outside the face to face sessions was handled via email or through *My Dundee*. Also the final timeline for the delivery of the course was agreed at this meeting. The fourth meeting of the Partnership Group took place on 10th June 2011at which time final plans for the day workshops and twilight sessions were finalised. A final meeting of the Partnership Group took place prior to the first Twilight session on 26th October which provided an opportunity to review the process of implementation and refine forward plans. This planning process is captured by the Curriculum Development dimension in the second row of the project plan as outlined in figure 1.

<table>
<tr><th>Phase</th><th>August 2010 - July 2011</th><th>August 2011 - February 2012</th><th>March 2012 - June 2012</th></tr>
<tr><td>Design Research Framework</td><td>Informed exploration</td><td>Research & Evaluation for Local impact
Pre-trial survey and focus group interviews</td><td>Research & Evaluation for Broader impact
Post-trial survey and focus group interviews</td></tr>
<tr><td>Curriculum Development Framework</td><td>Curriculum planning</td><td colspan="2">CPD Module Enactment
ORIENTATION PLANNING WORKING & REFLECTING EVALUATION</td></tr>
<tr><td>Classroom Action Research Cycles</td><td>Recruitment of participants</td><td>Reconnaissance</td><td>PLAN ACT OBSERVE REFLECT REVISED PLAN ACT OBSERVE REFLECT</td></tr>
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Figure 1: DMTPC Project Plan

6.0 Implementation

As outlined in Appendix 1, the module was opened in the online environment on 19th September 2011 and was followed closely by the first day Workshop on Saturday 24th September. There were two Twilight sessions as part of the course which took place on 26th October and 7th December 2011 and a final day workshop on Saturday 4th Feburary 2012. For those completing the associated assignment, the submission date was set for 23rd April 2012 which marked the end date of the course of study.

There were 26 participants at the start of the module who were all practising primary teachers. This included a group of teachers from Perth and Kinross, following an approach from the LEA to be involved in the project. The group was made up of 25 females and one male, with an age range from 21 to 55. Not long after the course started two of the female participants withdrew citing pressure of work.

The assignment for the course of study which was undertaken for the award of 30 Masters level credits was in the form of an Action Research Project report of 5000 words. Participants were required to design a project that would consider the implications of current literature on the development of mathematical thinking; identify strategies, skills and attitudes to be developed; identify methods of data collection and analysis that provide evidence of impact; be feasible and realistic in terms of the resources available in school; give consideration to progression and assessment and identify the issues which emerged from the study. All participants took part in the first planning stage of this process through undertaking an audit of their practice, supported by input from the LEA support staff. This was then used as the basis of the development of an action research plan for a small-scale project designed to develop mathematical thinking in their classroom which was supported by the university staff. Accordingly formative tutor feedback was given on action plans which were submitted via *My Dundee* in due course. The second stage involved undertaking the project and completing the writing up of the Action Research Project report. In this report, participants were required to reflect upon the role of the teacher in developing mathematical thinking and promoting good mathematics teaching; indicate how the study has impacted on classroom practice and children's learning, referring to the supportive evidence and to conclude with an evaluative summary of the participant's learning from the study and how this might be developed further in the future.

Ten of the participants submitted Action Research Project reports which were assessed by the tutor team in May 2012 and all were deemed to have passed successfully subject only to the need for some minor technical corrections. The projects addressed a diverse and highly relevant range of topics as outlined below:

1. Meeting the challenges of mixed ability mathematics in a multi composite class
2. An inquiry into the use of non commercial resources to develop children's mathematical thinking
3. Open-ended activities and encouraging collaborative talk with 7-8 year olds.
4. Using real life mathematics in the everyday teaching of the subject to engage and develop mathematical thinking
5. An examination of the effects of pupils carrying out open-ended investigations in mathematics and using a variety of media to communicate their mathematical solutions and ideas
6. Using questioning to extend the mathematical thinking of infants and to increase the children's ability to decompose and recompose numbers.
7. To what extent does topic-based mathematics allow children to demonstrate their mathematical thinking?
8. How does investigating proofs with Primary 2 develop mathematical thinking?
9. A collaborative investigation into developing mathematical thinking – making connections
10. How do the teacher's questioning skills have an impact on mathematical thinking?

The report on the study on topic-based mathematics (7) was judged to be an outstanding achievement. This is an exemplar of the role of the teacher as researcher at its best, involving innovative and creative planning, spontaneous and responsive classroom action, finely grained classroom observation and insightful evaluation. The teacher who conducted the study accepted an invitation to present her work at the School Research Conference on 19th June 2012 and gave a thoroughly professional and quite inspiring presentation of her work. She has been invited to develop her text for submission to the professional journal 'Education Today'. Also she is currently in discussion, along with a number of other course participants, with the Programme Director of the MEd with a view to completing a further MEd module which would lead to her being one of the first teachers to be awarded the recently validated award of 'Postgraduate Certificate of Education in Developing Mathematical Thinking'.

7.0 Evaluation

7.1 Methodology

The project was established within a Design Research framework as indicated in figure 1. Such an approach aims to support the construction of propositions for actions in relation to teaching and learning and to design and construct teaching situations, pedagogical activities and learning environments that enable both teachers and learners to put these propositions into practice. In this case the focus of development has been primarily on teachers' professional learning. The key research questions addressed were:

1. What are the teachers' perceptions concerning their levels of confidence and competence in relation to teaching mathematics?
2. What are the teachers' attitudes and beliefs in relation to mathematics as a subject?
3. What are the teachers' expectations of the impact on pupil learning arising from this course of study?
4. How do these perceptions, attitudes, beliefs and expectations change as a result of participating in this course of study?

Empirical data were drawn from pre- and post-course surveys of the teachers' perceptions, interviews with participants, observations of engagement in the online environment, document analysis of audits of classroom practice and action plans for classroom inquiry.

7.2 Pre- and Post-Course Surveys

The pre- and post-course surveys were based on a series of statements drawn from the 'fundamentalist-fallibilist' model discussed fully in Hudson, Henderson and Hudson (2012). This is based on a prior analysis which compares the influences from very different epistemological traditions on school mathematics today. It is argued that it is not simply the dominating influence of this deductivist style of mathematical formalism which is a main problem for the teaching and learning of mathematics in schools today. Rather, by drawing on the conceptual frameworks offered from the educational and anthropological sciences as discussed by Schneuwly (2011), it is the way in which this can become distorted in the process of 'transposition' into school mathematics into a form of fundamentalism that involves a strict adherence to a set of dogmatic doctrines – in particular when teachers lack confidence in their own mathematical ability and are placed under pressure to perform as a result of high stakes external testing and school league tables. In the school context, this knowledge is not knowledge for acting and solving problems in the social contexts in which it was created and where it is used, but it is instead transposed into knowledge to be taught and to be learned. The concept of didactic transposition is based upon recognition that this 'rupture' between daily life and school can change the knowledge profoundly. A fundamentalist perspective promotes an authoritarian view of mathematics that hides the struggle and adventure involved which, in turn, is the very antithesis of the conditions needed to foster learner autonomy, independence and critical thinking. In contrast, mathematical fallibilism (Lakatos, 1976) argues for a view of mathematics as human activity and that it is this human mathematical activity that produces mathematics.

Accordingly participants were asked to indicate Strongly disagree, Disagree, Agree or Strongly agree against a number of statements based on this model. In addition they were asked their ages, how many years they had been teaching, the primary stage they usually teach and their highest level of mathematics qualification. Finally in the pre-course survey they were given the opportunity to comment on what had prompted them to embark on the course and in the post-course survey their experiences of the course. The post-course survey was completed by 15 of the participants.

As can be seen in figure 2 there was a distinctive move from the fundamentalist viewpoints held by many of the participants at the start of the course, in particular those relating to the absolutist nature of the subject regarding rules, right and wrong answers and testing. With the move to more collaborative work in primary schools it is not surprising to see that there was little agreement before the course and none after for the statement 'Maths is a solitary activity'. It is also interesting to note that despite many of the fundamentalist viewpoints held only 15% of participants reported that they found mathematics boring before the course with this figure dropping to 7% after it.

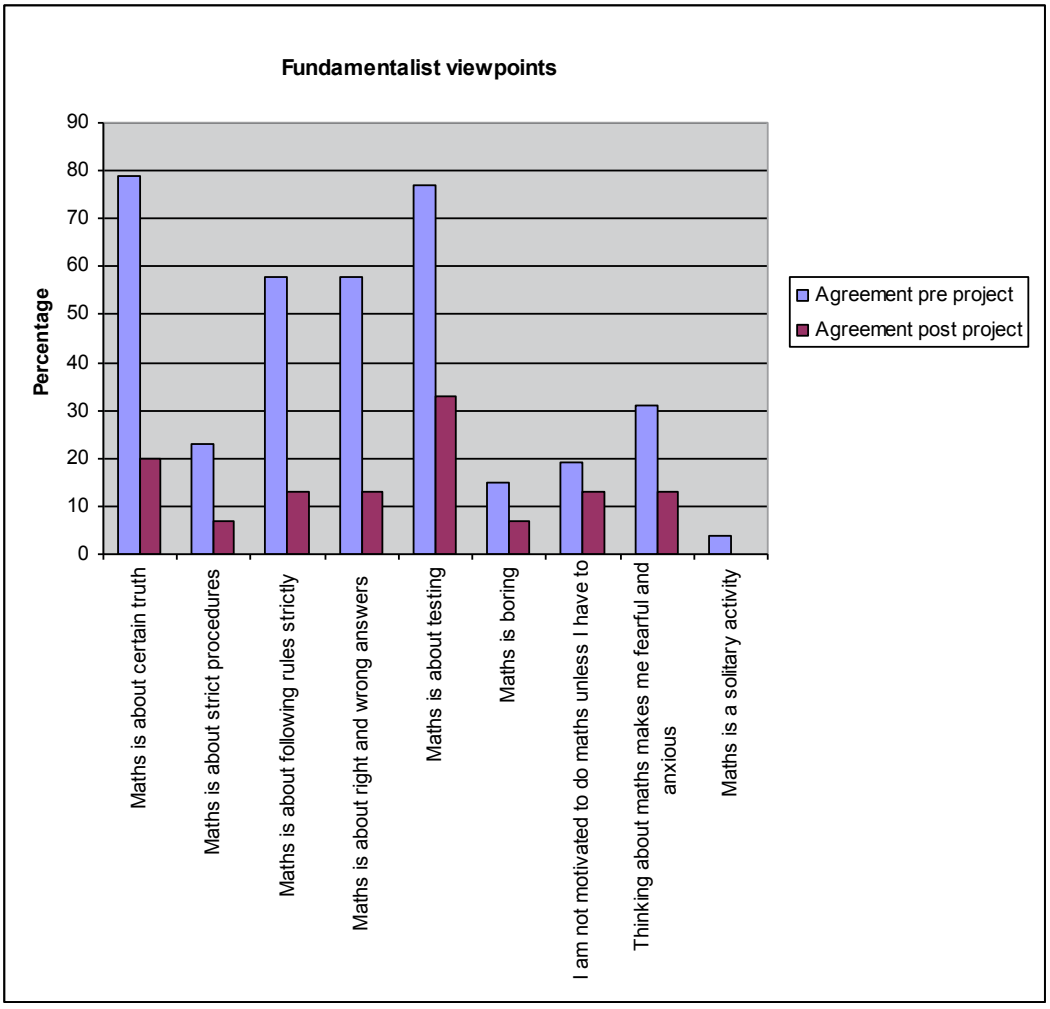

Figure 2: Changes in fundamentalist viewpoints pre- and post-course

The participants appear to have been liberated by the course to adopt a more fallibilistic stance. This is borne out by many of the comments made in the post-course survey:

I experienced many light bulb moments.

… the course has had a significant effect on my day to day teaching.

I now teach differently because this course has helped me identify what really matters in maths learning.

The impact on my own class has been enormous.

I have become much more flexible and creative in my teaching

While there were notable moves from the fundamentalist standpoint these were no such moves in the other direction as can be seen in figure 3.

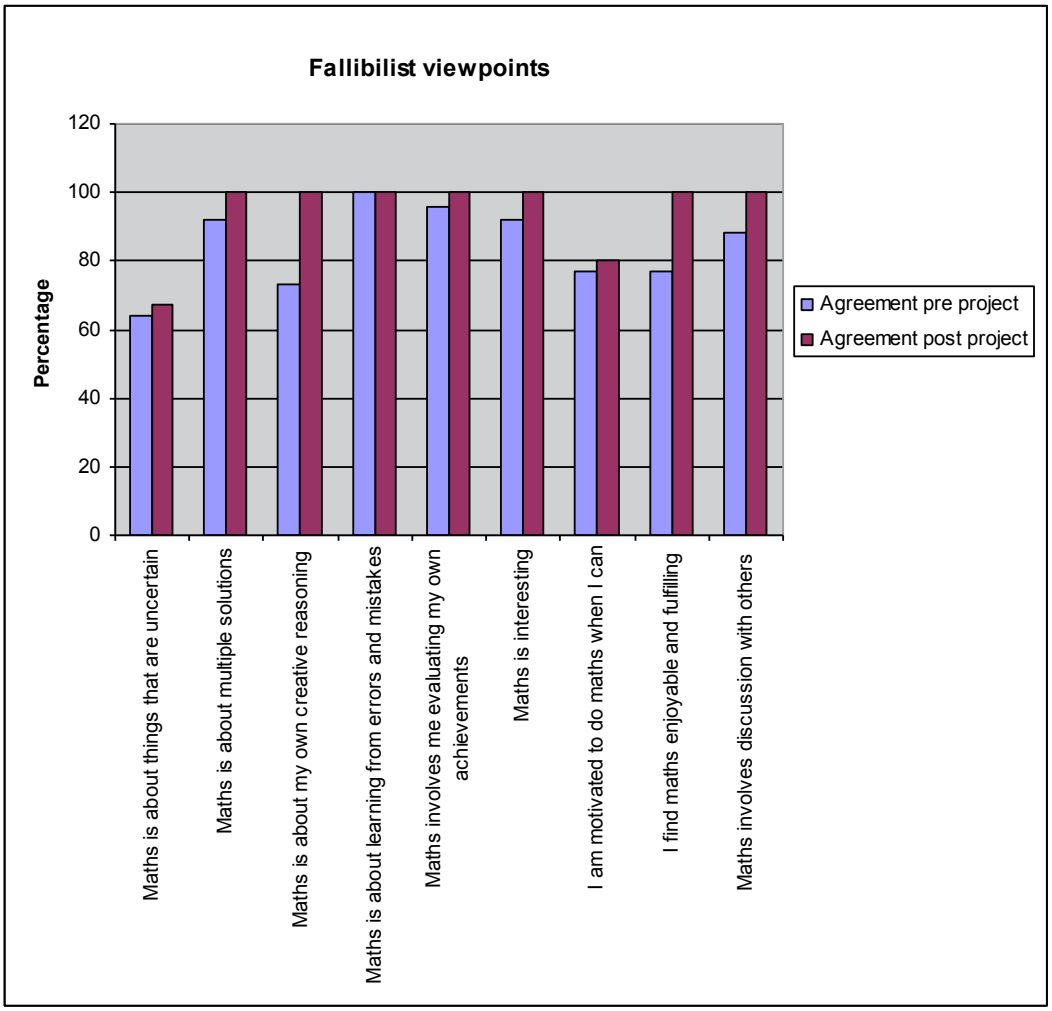

Figure 3: Changes in fallibilist viewpoints pre and post course

In other words fallibilist beliefs held were not challenged in any way by participation in the course and indeed the opposite can be assumed as agreement with all statements increased or stayed the same. The greatest moves noted were in response to the statements *'Maths is about my own creative reasoning'* and *'I find maths enjoyable and fulfilling'*.

Participants were asked about their levels of perceived competence and confidence in mathematics pre- and post-course and these results are displayed in figure 4.

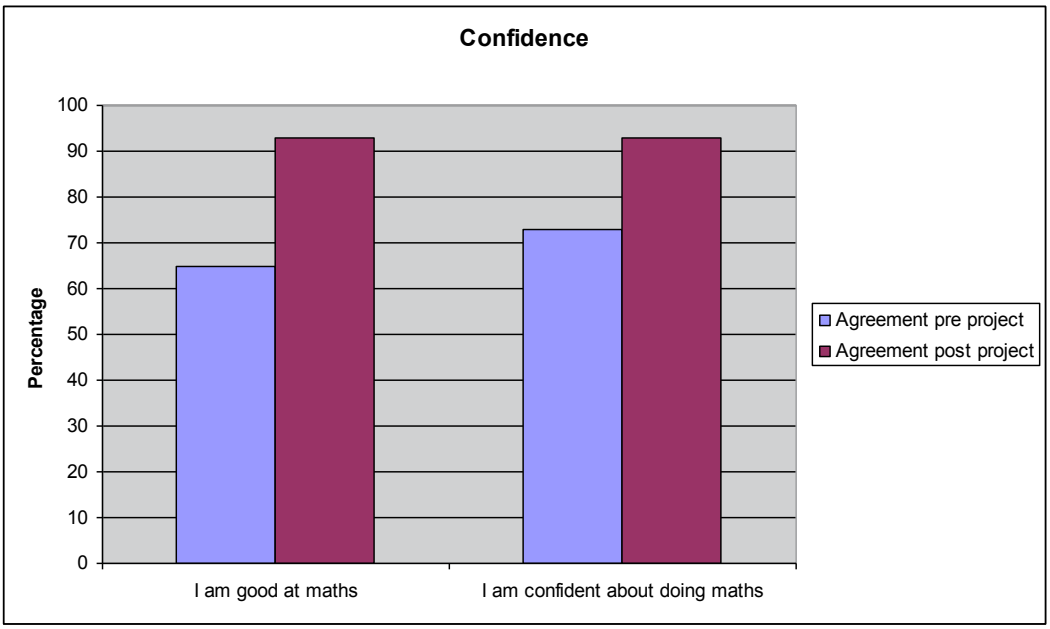

Figure 4: Pre- and post-course levels of perceived competence and confidence

While 65% and 73% of participants already reported that they were good at and confident about mathematics before the start of the course, these figures rose to 93% in both categories by the end of the course.

7.3 Interviews

The interviews were conducted with four participants pre- and post-course by the Project Researcher, Dr Alison Hudson, which focussed on teachers' perceptions concerning their levels of confidence and competence in relation to teaching mathematics; their attitudes and beliefs in relation to mathematics as a subject and their expectations of the impact on pupil learning arising from this course of study.

Further detailed analysis of the data is ongoing at the time of writing this report in preparation for the presentation of a research paper at the European Conference on Educational Research in Cádiz in September 2012 (Hudson, Henderson and Hudson, 2012). However findings from the initial stages of data analysis can be reported at this stage and these reveal the way in which the course has had a transformational and emancipatory impact on a significant number of these teachers, several of whom also report profoundly oppressive experiences of their own early mathematics education whilst they were pupils at school.

A qualitative approach was taken to the analysis of the interviews which resulted in the identification of two particularly strong emergent themes which we describe as 'being allowed' and 'labelling'. A comprehensive analysis will be presented in Hudson, Henderson and Hudson (2012), drawing on the theoretical lenses provided by Bernstein's (2000) concept of 'framing' and that of 'symbolic violence' (Bourdieu and Wacquant, 1992). Framing is a way of describing the locus of control over the selection, sequencing, pacing and criteria for evaluating or assessing what counts as legitimate knowledge. The historical impact of assessment practices on these teachers as learners is illuminated, as is the tension between the strong framing of current formal assessment practices and the relatively weaker framing of Curriculum for Excellence. In her study, Hudson (2009, p72) highlights the way in which 'a form of symbolic violence was employed to convey messages of social order' during her own experience at primary school. The concept of symbolic violence is used to identify the existence of hidden struggles activated socially by a holder of capital as a means of limiting and controlling the agency of individuals with less capital. A pupil may thus favour acceptance of 'the world as it is' and find the dominant order and the labels assigned to them 'natural'. In other words, symbolic violence is about how the dominated or stigmatised come to accept their own conditions of domination and inferiority.

The interviews were structured around a number of key issues which are outlined in the following sections together with a selection of quotations from teachers which give a flavour of the overall responses.

7.3.1 Pre-Course Interviews

Four teachers were interviewed prior to taking the course of study, one from each local education authority (Dundee, Fife, Angus and Perth and Kinross).
Each teacher had 10 years or more classroom experience.

The approach taken was to use semi-structured interviews on the themes of:

- confidence and competence in relation to teaching mathematics
- attitudes and beliefs in relation to mathematics as a subject
- and expectation of the impact on their practice and on pupil learning arising from the course of study

In addition at the start of each interview each teacher was asked to talk about their own personal early educational experiences of mathematics.

The interviews produced rich data. Similar themes emerged from all four interviews.

Early experiences and critical incidents

When asked about their own early experience of mathematics, each teacher gave an account of at least one negative experience which had remained vivid in their memory. Furthermore the nuances of mathematical fundamentalism were inherent in the discourse used by the teachers. For example one teacher described her own experience as being about 'learning to pass exams', while another spoke of 'not understanding the relevance of mathematics'.

Moreover all four teachers recall having been positioned or labelled in terms of their ability in mathematics. Each teacher described either a symbolic or physical positioning which took place and talked about the stigma that accompanied it. In fact one teacher who started in the 'top class' for mathematics at secondary school described how she was 'pulled out of the classroom' and 'very quickly shoved into another one' where she was not expected 'to do very much'. Indeed she described herself as 'definitely one of these people who have labelled themselves as not a maths person'.

> *'I have allowed myself to be labelled, and I have labelled myself and I have carried that label on and really that change has to come from me and I am quite intrigued now about getting involved in this module and shaking that off and coming to the end of this …. and being someone who does maths. … I am quite excited about maybe being someone in my own school who has the competences that will be helpful to other teachers as well, and that is something a million miles away from the person doing higher maths and not understanding a word of it'.*

This particular example illustrates both a negative school experience and it also articulates the strong desire expressed by all four teachers of wanting to 'make a difference' to the mathematical experience of their pupils.

Confidence and Competence

Each teacher talked with enthusiasm about mathematics. Most notably they each talked about changing and developing as a teacher over time and at the same time developing their confidence in mathematics. This slowly developing confidence in teaching mathematics was gained through classroom experience and was specific to the age range taught – or, as one teacher described it - their 'comfort zone'. All teachers referred in some way to being at a stage when mathematics was 'becoming clearer'. Whilst all four teachers were clearly gaining confidence in their own mathematical ability the journey up to this point had taken time (over a period 10 years for all) and was clearly linked to gaining experience as a teacher in general.

Expectations of the course

When asked about their expectations of the course all four teachers interviewed hoped to gain new ideas and develop understanding of new methods. They all expressed a desire to have the confidence to try out new methods and not rely on text books. Indeed one teacher talked about her struggle to 'step away from the workbook' and the discourses of 'control'.

Whilst there was a certain amount of trepidation amongst the teachers regarding the course they were all highly motivated by the 'challenge' and saw both the course and Curriculum for Excellence as 'opening the door' to try out new and creative approaches to teaching mathematics which could be shared with the children. In particular there was an expectation that by bringing theory, research and practice together in the classroom their mathematical activities would gain 'credibility' and tacit knowledge would become explicit and formalised. In addition it was clear that all four teachers had been supported and encouraged locally and all expressed a desire to 'make a difference' in terms of helping children to understand and enjoy mathematics.

7.3.2 Post-Course Interviews

Towards the end of the course three of the original group of teachers were interviewed with a fourth teacher who volunteered to replace a teacher from the original group who was unable to attend the post course interviews. In line with the pre-course interviews each teacher was from a different authority.

Confidence, understanding, practice and approaches to teaching

All teachers spoke with enthusiasm about the difference that the course had made to them particularly in terms of gaining confidence in their teaching of mathematics in the classroom. The difference was explained in various ways, for example emphasis was placed on 'taking time', 'using a variety of methods', 'relating maths to real life' and 'being allowed'. One teacher described how she now had the confidence to 'take time' over her teaching of mathematics.

> *'I think being allowed to actually take time over a piece of mathematics. (….) it's not just a case of getting through 15 pages of maths. I'm quite happy now to get through a couple of written pages, I look at the concepts that you are being asked to teach and I tackle them in different ways, I choose a variety of teaching methods and I find the children respond much better to this as well.'*

Another teacher explained how the course had been beneficial in supporting her work with other teachers in her school.

> *'… for my professional development it's been fantastic. Just to be able to speak to colleagues and have the confidence to say I have done this in my classroom, I know this works and I'm Acting PT at the moment in my school so within my department I have been able to say to staff, you know, I'm happy for you to try something different, …don't feel you have to stick to these structures.'*

Indeed all four teachers interviewed talked about having the confidence to try new approaches and different ways of teaching mathematics. One teacher talked about teaching through questioning:

'… for me, the main difference in my teaching is now I do more asking than telling, ..'

Similarly another teacher described her open-ended questioning and her 'very, very active classroom'. Another teacher explained that how, for her, the course had been an affirming process that was now helping her to support mathematical development in her school.

'I think that doing this has confirmed to me that I have a pretty good understanding of maths and how to teach it and so, now that my Depute is actually doing the course as well, it's nice because we want to create a whole school approach. We want to actually take this back to our Head (…) and actually say, right this is what we've done, it's been really useful and this is why. So, we see a future in what was started here, I see a future for it actually going on.'

Benefits to the pupils

All teachers interviewed talked with passion about the positive impact their teaching had had on the children in their classroom. Indeed there was a sense of revitalisation. One teacher talked about having high expectations and creating a relaxed stress free environment. Another teacher talked about teaching that 'has allowed the kids to find out what maths is about'.

'… they're actually listening to what I say!" …they're using this language with you which is brilliant. I think the main thing is the children's confidence, they don't feel that they're not being allowed to do something. They don't feel that there's …. the barrier there. …. I hope that the children in my class now know that if they put in the effort and they participate they can go as far as they want.'

All teachers interviewed talked about the children gaining confidence and enjoying mathematics.

Additional dimensions of the course

The course was clearly seen by the teachers to be beneficial to the development of mathematics teaching in the classroom. An additional dimension that one teacher mentioned was the positive relationship between the course and the implementation of Curriculum for Excellence.

'… with regards to my maths teaching, that has certainly changed and again, ….I would say it was a combination of attending the course it's making me think more about maths and also the introduction of Curriculum for Excellence,…'.

All four teachers commented on the creativity, depth of knowledge and understanding developed and the benefits gained from the set readings.

'It's definitely been very, very … you know, sometimes you do CPD and think "oh it's a waste of time what do I do that for", but this has, yeah, this has been really, really valuable.'

8.0 Dissemination

The project has involved an ongoing process of dissemination for local and broader impact throughout as an integral part of the design research process.

Accordingly the team has sought to engage with both the academic community and also the professional community throughout. As part of the process of meeting both aims a web presence was established at an early stage of the project development, details of which can be found at this link:
http://blog.dundee.ac.uk/mathematical-thinking/

A series of dissemination activities is listed below, further details of which may also be found at the project web site.

August 2010

Article in the TESS announcing the project:
http://www.tes.co.uk/article.aspx?storycode=6055987

December 2010

Invited presentation to workshop in Sweden:
Henderson, S. and Hudson, B. (2010) *What is design research, what is the point of it and what do we want to do?* Invited seminar presentation, Umeå Mathematics Education Research Centre, 16th December 2010

June 2011

Presentation made to the School Research Conference which focussed on the background, aims and project design.
Henderson, S. (2011) *Developing Mathematical Thinking in the Primary Classroom: Report of Work in Progress,* ESWCE Research Conference, Dundee, 23rd June, 2011.

November 2011

Paper outlining the project and presenting some initial data analysis presented at the SERA 2011 Conference:
Henderson, S., Hudson, A. and Hudson, B. (2011) *Developing Mathematical Thinking in the Primary Classroom*, Scottish Educational Research Association Conference, Stirling, 25-26th November, 2011.

May 2012

A seminar presentation entitled *Developing Mathematical Thinking in the Primary Classroom*: Liberating Learners of Mathematics was made as part of the STEM Education Research Network contribution to the School seminar programme.

August 2012

Production of this Final Project Report

September 2012

The following paper has been accepted for presentation at the ECER 2012 in Cádiz
Hudson, B., Henderson, S., and Hudson, A. (2012) *Teachers' Perspectives on Developing Mathematical Thinking in the Primary Classroom*, European Conference of Educational Research, University of Cádiz, 18-21 September 2012.

This paper will form the basis of a submission to a peer reviewed international academic journal.

November 2012

A paper has also been accepted for publication at the SERA 2012 Conference:
Hudson, B., Henderson, S. and Hudson, A. (2012) Developing Mathematical Thinking in the Primary Classroom: Liberating Learners of Mathematics, Scottish Educational Research Association Conference, University of West Scotland, 21-23rd November, 2012.

9.0 Ensuring Sustainability

The project has resulted in the validation and trialling of a new module in the MEd programme and also in a new series of awards, i.e., the Postgraduate Certificate, Postgraduate Diploma and Master of Education in Developing Mathematical Thinking. As indicated earlier there is interest from a number of participants within the existing cohort in pursuing one of these named awards and it is intended to promote further publicity on the basis of the contents of this report. Given the flexible delivery of the MEd programme at the University of Dundee, the potential does exist to offer this course much more widely.

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